2002 COLONIAL WATERBIRD BREEDING SUMMARY
CAPE HATTERAS NATIONAL SEASHORE

Colonial waterbirds established eleven active colonies along Cape Hatteras National Seashore (CAHA) in 2002. This is one more colony than what was found in 2001. Species breeding on Seashore beaches this year include Least Tern (*Sterna albifrons*), Common Tern (*Sterna hirundo*) and Gull-billed Tern (*Gelochelidon nilotica*), as well as Black Skimmers (*Rinchops niger*. All are listed as Species of Concern in North Carolina except for Gull-billed Tern having Threatened status (North Carolina Heritage Program, 2003). Breeding activity occurred between May and August. In many cases, birds utilized areas already closed to the public for breeding American Oystercatchers (*Haematapus palliatus*) and Piping Plover (*Charadrius melodus*). In other areas, symbolic fencing was erected once birds were observed exhibiting courtship behavior or nests were found. As in recent years, most of the colonies were comprised of small groups of Least Terns. The largest and most diverse colony was located at Ocracoke Inlet flats. Annual nest counts were not conducted in 2002.

Breeding Sites

Bodie Island and Oregon Inlet

No colonial waterbird activity was reported on Bodie Island in 2002. Small groups of courting Least Terns had been observed the previous three years on the inlet flats. Nests were found only in 2000 though these were lost to overwash. A flood tide shoal located in the southwestern portion of Oregon Inlet has recently been found to be within the CAHA boundary. After terns were observed nesting there this year, neighboring Pea Island Wildlife Refuge (PIWR) agreed to transport NPS staff out to the shoal in order to post the site. Plans to post the site were cancelled after the shoal was almost entirely flooded for several days and nests were presumed lost. Evidently, some nests survived since North Carolina Wildlife Resource Commission (NCWRC) reported observing a small number of chicks in late July. In 2001, NCWRC had posted the site and recorded 189 nests, most of which were Common Terns.

Hatteras Island

On the island's east-facing beaches, six water bird colonies were established compared to five colonies in 2001. All were comprised solely of Least Terns except one having both Least and Gull-billed Terns. Three of the five colonies were in vehicle-free zones. None of the colonies were found on CAHA beaches adjacent to development though one site was located immediately north of Avon village. Site locations, from north to south, were as follows: 1.3 miles south of Ramp 23, 1.5 miles south of Ramp 27, 0.2 miles south of Ramp 30, 0.1 miles south of Ramp 34, 0.3 miles north of Buxton and 0.5 miles south of the original Cape Hatteras lighthouse site. The colony site north of Buxton was new this season, being situated in the site overwashed by Hurricane Dennis in 1999. This was also the most isolated site since there was no parking along the adjacent highway, a large new dune line discouraged pedestrians and the beach was vehicle-free. All areas were posted when bird activity was found. Though actual productivity could not be measured, four of the six sites produced both chicks and fledglings. Reproductive success had been low along these beaches for several years. Evidence of crow (*Corvus spp*.), feral cat

(*Felis domesticus*), domestic dog and an unidentified canine were recorded in various closures in 2002.

Three colonies were established on south facing beaches of lower Hatteras Island. All were in sites normally opened to off-road vehicle (ORV) traffic that had been posted at the end of March for the protection of breeding American Oystercatchers and Piping Plovers. Least Terns utilized all three sites; Gull-billed Terns were found in only one site. One colony site was abandoned after an initial breeding attempt failed only to be reestablished two weeks later in the same general area. For the purpose of this report, they are considered two separate colonies. Few nest and no chicks were ever observed in these three sites. Red fox likely caused or contributed to nesting failure since tracks were found in the three colonies. These closures were also located on beaches adjacent to high recreational activities.

Ocracoke Island

One colony was established on Ocracoke Island in 2002. A second site that had supported a small Least Tern colony since at least 1995 was not used this nesting season. After the breeding season the site, located approximately one mile northeast of Ramp 70, was used by roosting Least Terns. The Ocracoke Inlet flats supported the largest and most productive colony in CAHA this year. All four colonial waterbird species previously mentioned nested here. Though a nest count was not conducted this year it appeared as sizable as in 2001 when 834 nests were identified. Cat tracks were seen entering the northern section of the colony in the early part of the summer. Mink were believed to have caused nest failure among Least Terns as numerous mink tracks were found in area of the colony, which the species occupied. Fish crows were commonly seen near the colony. Their tracks as well as those of ghost crab (*Ocypode quadrata*) and feral cat were found within the Ocracoke colony.

Nest Success

Sixteen colonial waterbird nests on Ocracoke were marked and followed to determine success (Chart 1). The nests of eight Black Simmers, three Gull-billed Terns, two Common Terns and three Least Terns were marked with wooden sticks painted red. Nests were revisited every three days to document any changes. Five nests were known to have successfully hatched (three Skimmers, one Least and one Gull-billed). Two nests were known to be lost, both were Least Tern. Of the two, one was lost to avian predation and the second appeared abandoned. The successes of the remaining seven were undetermined due to removal of nest markers (likely by incubating adults) or due to a break in data collection. It was interesting to note that eggs disappeared from five known nests during incubation. This occurred in nests of all species represented. Of the five nests, four lost a single egg each while one lost three eggs, including an egg previously broken by an unknown cause. This same scenario has been seen in Piping Plover nests protected by predator exclosures within CAHA as well as at other North Carolina plover nests (Dave Allen, NCWRC, personal communication). It is believed that ghost crabs may be causing the egg loss. Plover eggshell fragments have been found in ghost crab burrows at Cape Lookout National Seashore (CALO) (Jeff Cordes, NPS, personal communication) and in other cases outside crab burrows (Sue Cameron, NCWRC personal communication).

Shade Structures
It has been noted that young chicks are attracted to the closure posts to take advantage of shade. In ORV areas, vehicles drive along the immediate edge of the closure. This puts chicks in close proximity to life threatening situations. For the second consecutive year, approximately one dozen shade structures were placed in colonies, primarily in Ocracoke. Each was an open wooden structures made with 10" x 6" tops supported at each end by 3" x 6" "legs". As in 2001, chicks and some adults were observed utilizing them but not in large numbers. No avian predators were observed homing in on the structures. Mink tracks were seen around one structure placed in the Ocracoke colony.

Human Disturbances
Nesting colonies along much of the east and south of Hatteras Island were again located on narrow beaches and in areas of high visitor use. Colonies situated on narrow beach sections are more exposed to disturbances caused by human activity. Disturbance can lead to nesting failure. The North American Colonial Waterbird Conservation Management Plan recommends a minimum buffer of fifty yards to the nearest nest. At least eight colonies did not meet this minimum buffer. Four Least Tern chicks were found crushed in tire tacks outside two closures near ramps 23 and 27. As a result, these particular closures were expanded to the water's edge temporarily closing a total of 0.3 to 0.4 mile to ORV and pedestrian traffic. Two crushed skimmer chicks were found in vehicle tracks outside the Ocracoke colony. The closure was expanded without affecting ORV and pedestrian traffic on this broad beach.

Incidents of visitors entering posted bird closures at CAHA were documented between April and September of 2002. These closures did not only represent sites where colonial waterbirds nested but also American Oystercatcher and the threatened Piping Plover. Most illegal entries were not witnessed but documented based on vehicle or pedestrian tracks left behind. Numbers are conservative since some individual records involved more than one vehicle or pedestrian. A total of 52 incidents were recorded of ORVs entering posted bird closures. This number is similar to the 63 incidents recorded in 2001 and 58 vehicle entries documented in 2000. Of the 52 incidents reported in 2002, two occurred on Bodie Island, 36 on Hatteras Island and 14 on Ocracoke Island. These incidents required, at minimum, repairs to twine strung between posts but often involved the replacement of broken posts and signs. Illegal pedestrian entries in bird closures numbered 133 compared to 247 incidents recorded last year. In 2002, 45 occurred on Bodie Island, 85 on Hatteras Island and three on Ocracoke Island. Contacts were made with several people found defecating within the posted area. Judging by the amount of human feces and toilet paper left behind; this was one of the main reasons people entered the closures. Other people contacted said they thought the closures were only for ORVs though the signs clearly stated pedestrian entry was also prohibited. Each entry required visitors to stoop under string that connected all posted signs. Unintentional human disturbance may have resulted in colonies where closures were not large enough to supply ample undisturbed habitat.

Predator Management
In March of 2001, grant money became available to study feral cat populations in CAHA for one year. Live traps caught 106 cats on Bodie, Hatteras and Ocracoke Islands and they were

transported to Dare County Animal Shelter (Altman, 2002). Of these, 98 were from Hatteras Island. Parkwide, 50% were trapped between the southern border of Avon and the southern border of Salvo. Cat populations were highest near villages. Boundary line track surveys determined that cats often traveled from village lands to CAHA beaches. Cat activity was found at beach bird nesting sites. However CAHA staff recorded fewer signs of feral cats after removal efforts were underway in 2001 and 2002. The recent arrival of red fox on Hatteras Island may have also curtailed cat populations since they are known prey for these canids.

Red fox populations have been expanding their range southward in CAHA. They were first reported on Bodie Island in 1996 and on Hatteras Island in 2000. Their presence has impacted all ground nesting birds at Oregon Inlet flats, Cape Hatteras Lighthouse beach, Cape Point, South beach and Hatteras Inlet spit. The new Hatteras Island fox population likely used the Bonner Bridge as a corridor to the island last year. Melvin Covey, a Buxton resident, observed a red fox moving south on the bridge in 1999. Kris Fair of PIWR observed a dead red fox on the bridge approximately 100 yards from the northern terminus in October 2002. There are no historical records of red fox on Hatteras Island. In 2001, fox depredation was recorded on threatened loggerhead turtle eggs and hatchlings. Fox causing abandonment targeted two plover nests protected by predator exclosures. American Oystercatcher nests were also targeted by this highly efficient predator. Based on the continued and growing danger fox would present to threatened species, CAHA decided to trap and remove fox. Funds were procured with the help of U.S. Fish and Wildlife Service. Professional trappers from the US Department of Agriculture (USDA) made two trips to the area in June and July. A total of 28 fox were removed in CAHA. Twelve fox were trapped on Hatteras Island between Cape Point and Hatteras Inlet in June. In addition, twelve animals were removed from the dunes adjacent to the Bodie Island spit flats and the Bodie Island “bone yard” near the Bodie Island Light Station. In July an additional four fox were taken from Bodie Island, all from the same dune field area near the inlet flats. No fox were successfully trapped from Hatteras Island in July. Unfortunately for the colonial waterbirds, nests were already lost to red fox before trapping began in June and at least one fox appeared to be roaming the beaches southwest of Cape Point throughout the nesting period. USDA believed that one bachelor with a large home range was still present at the end of the summer on Hatteras Island and that there was likely a den in the area between Salvo and PIWR. The fox population on Bodie Island is still well established.

Conclusion and Recommendations

In recent years productivity has been low in the small Least Tern colonies scattered throughout CAHA. In 2002, four of the ten small colonies produced fledglings. Though actual productivity levels of colonial waterbirds in unknown at CAHA, more chicks and fledglings were observed this year than in recent years. The most productive colony was located at the Ocracoke flats. The posted area was large, reducing potential human disturbance except near its periphery. Large colonies often have more defenses against predators, though mink did cause nest failure among Least Terns at the Ocracoke site this season. The absence of major storm related overwash incidents contributed to its success. Besides conducting periodic nest counts, it is important that CAHA staff periodically examine actual nesting success. It is more problematic to assess fledgling rates since chicks move around the colonies soon after birth. NCWRC has recommended that CAHA enhance this important site by creating additional "high ground". This

could be done by placing driftwood in the area in hopes of catching sand and thus building more small dunes.

Efforts to reduce feral cat and red fox populations need to continue. Control of native predators that target any State listed threatened or endangered species should be considered. NCWRC is presently studying impacts of ghost crabs on nesting colonial water birds. The results could shed insight to factors related to egg and chick failure in CAHA.

CAHA staff needs to be more aggressive in protecting breeding habitat in the spring. Potential breeding grounds within CAHA must be promptly identified and protected even before birds arrive, when possible, to reduce human disturbance leading to abandonment. Closing areas after birds appear is not the best management practice. CAHA staff definitely disturbs the congregation of birds in the process of posting closures. Each closure should supply adequate buffers or the colonies could fail due to direct or indirect human disturbance. Protecting this habitat would result in temporary closure of some areas to ORV's and other recreational activities. The impact from human disturbance needs to be better monitored. Since CAHA has management responsibilities of the large shoal at the mouth of Oregon Inlet, it needs to be posted each spring. It may be that State and Federal agencies cooperate in its protection should it continue supporting nesting birds.

The reduced presence of law enforcement rangers has taken its toll. Many visitors ignore regulations. The majority of dogs are unleashed and run freely. People frequently enter posted bird areas. These behaviors reflect the need to increase enforcement patrols. CAHA's pet leash law needs consistent enforcement.

Public education should be a priority. Visitors need to be aware of the birds' vulnerability and steps that can be taken to reduce human disturbances. This can be done through interpretive literature, programs, and roving contacts. For example, kite flying activities are increasing, especially the use of large kites. Visitors need to know they must stay far from colonies while involved in this activity.

Development along the North Carolina coast is increasing at a fast pace. Federal lands such as CAHA, CALO and PINW become increasingly important for beach nesting colonial waterbird survival. Many species are showing serious decline in North Carolina. It is CAHA's responsibly to manage sites in such a way as to provide suitable, undisturbed habitat for breeding birds.

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Literature Cited

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Chart 1. Nest Histories of Sixteen Colonial Waterbirds on Ocracoke Colony
Cape Hatteras National Seashore 2002

Date	1. Skimmer	2. Gull Billed Tern	3. Common Tern	4. Common Tern	5. Gull Billed Tern	6. Least Tern	7. Least Tern	8. Gull Billed Tern	9. Least Tern
17-Jun	2 eggs	2 eggs	3 eggs	2 eggs	3 eggs	1 egg	1 egg	2 eggs	1 egg 1 chick
20-Jun	3 eggs	2 eggs	2 eggs - no evidence	3 eggs	2 eggs - no signs	2 eggs	1 egg	3 eggs	eggs & chick gone
23-Jun	2 chicks	2 eggs	2 eggs	3 eggs	2 eggs	2 eggs	1broken egg - avian predation	3 eggs	end
26-Jun	3 chicks	no eggs - no signs	2 eggs	3 eggs	2 eggs	1 egg - no signs	broken egg still present	3 eggs	
29-Jun	no data	end	no data	1 egg partially broken	no data	no data	no egg	3 eggs	
2-Jul	end		no eggs, unidentified tracks	no eggs - unidentified tracks	no eggs	2 eggs scattered	end	2 chicks, 1 egg	
5-Jul			end	end	end	end		end	
Date	**10. Skimmer**	**11.Skimmer**	**12. Skimmer**	**13. Skimmer**	**14. Skimmer**	**15. Skimmer**	**16. Skimmer**		
26-Jun	3 eggs	3 eggs	2 eggs	3 eggs	2 eggs	3 eggs	3 eggs		
29-Jun	no data	no data	no data	no data	no data	no data	no data		
2-Jul	3 chicks	3 eggs	2 eggs	nest marker gone	1 egg	eggs gone - no evidence	eggs gone - no evidence		
5-Jul	end	2 chicks,1 egg	2 eggs		1 egg	end	end		
8-Jul		end	nest marker gone		nest marker gone				